Degree: **B.Tech,**
Stream: **CSE/CSE(AI)/CSBS/CSE(AIML)/CSE(IOT)/ CSE(IOTCSBT)/IT**

End Semester Examination 2023 - Fourth Semester Examination, May-2023

Paper Code: PCCCS405 Paper Name: Artificial Intelligence & Machine Learning

Full Marks: 100 Duration: 3 Hours

Part - A

Attempt 10 questions
Each question carries 2 Marks (2 X 10)

1. What are the advantages of CNN over a fully connected DNN for image classification? 2,CO1,Remember

or

1. What do you mean by Machine Learning? 2,CO1,Remember

2. A child got burned after touching a hot pot. Now he never touches a hot pot. Which type of learning mimics this? 2,CO1,Remember

or

2. Which famous scientist coined the term "Artificial Intelligence"? Also mention the year. 2,CO1,Remember

3. State two issues in data pre-processing. 2,CO1,Remember

or

3. What is knowledge base? 2,CO1,Remember

4. What are the differences between Classification and regression? 2,CO2,Understand

or

4. Why does overfitting occur in some cases after model training? 2,CO2,Understand

5. Mention different methods for calculating the heuristic values. 2,CO2,Understand

or

5. What does k signifies in k-Means clustering? 2,CO2,Understand

6. Provide an example of a real-world application where the ReLU activation function is preferred over the sigmoid activation function. 2,CO2,Understand

or

6. Express the ways to formulate a problem? 2,CO2,Understand

7. Represent the facts in predicate logic. 2,CO3,Apply

   Joe is married to Sally.

or

7. Give an example of a situation where dropout regularization might be more effective than L2 regularization. 2,CO3,Apply

8. What is a recurrent neural network (RNN), and how does it enable the modeling of sequential data such as time series, natural language, and audio signals? 2,CO3,Apply

or

8. Explain the concept of hard clustering? Give an example. 2,CO3,Apply

9. How can artificial intelligence be used to improve the efficiency and accuracy of game playing algorithms? 2,CO4,Analyze

or

9. What is a weight in KNN feature selection? 2,CO4,Analyze

10. Identify the drawbacks of feed forward neural network. 2,CO4,Analyze

or

10. Provide an example of a practical problem where an RNN architecture, such as long short-term memory (LSTM), has been successfully used to achieve state-of-the-art results to solve practical problems in time-series analysis 2,CO4,Analyze

Part - B

Attempt 6 questions

Each question carries 5 Marks (5 X 6)

11. Show that the Sigmoid threshold function is antisymmetric about the point (0,1/2). 5,CO2,Understand

or

11. Explain the drawbacks of Breadth First Search and Depth First Search. 5,CO2,Understand

12. Relate the concept of confusion matrix? 5,CO2,Understand

or

12. How has artificial intelligence evolved over the decades? Justify 5,CO2,Understand

13. Define heuristics. Why are heuristics crucial for the efficient design of an expert system? 5,CO3,Apply

or

13. Explain the difference between CNN & RNN. 5,CO3,Apply

14. Explain the applications of different types of neural networks. 5,CO3,Apply

or

14. Relate to the cases where ReLU and Leaky ReLU activation functions are used. Also, mention why Leaky ReLU is preferred over ReLU. 5,CO3,Apply

15. Derive the update equations for an MLP with two hidden layers (all the neurons use sigmoid activation functions) 5,CO4,Analyze

or

15. Examine the concept of True Positive, True Negative, False Positive, and False Negative in Confusion Matrix with an example. 5,CO4,Analyze

16. Compare and contrast between bias and variance in Machine Learning? 5,CO4,Analyze

or

16. Explain the difference between vanishing gradient and exploding gradient problem. 5,CO4,Analyze

Part - C

Attempt 5 questions

Each question carries 10 Marks (10 X 5)

17. Summarize the need for non-linear activation function and draw the graphs of 10,CO1,Remember

    - Sigmoid
    - Tanh
    - ReLU
    - Leaky ReLU

or

17. State the difference between DFS and BFS. 10,CO1,Remember

18. Show that if the activation function of the hidden units is linear, a three-layer network is equivalent to a two-layer one. Use your result to explain why a three-layer network with linear hidden units cannot solve a nonlinearly separable problem such as XOR. 10,CO2,Understand

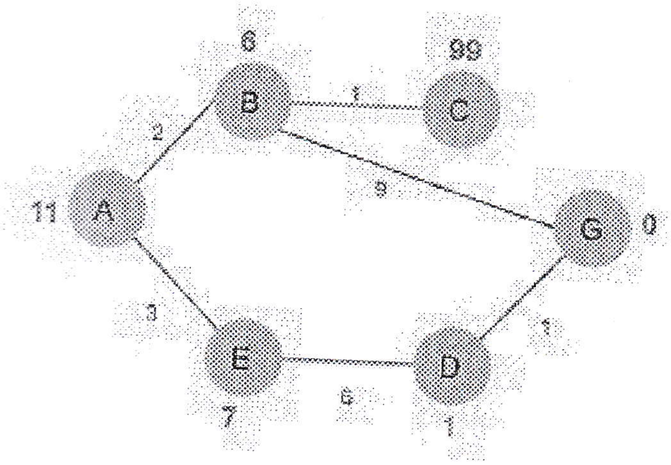
or

18. What do you think is the major set back of AI. Explain with a case study. 10,CO2,Understand

19. Evaluate the impact of the environment's layout on the performance of vacuum world agents. How might you modify the layout to create a more challenging environment for agents to navigate? 10,CO3,Apply

or

19. Find out how A* algorithm can be used to find the most cost-effective path in a graph. Consider the following graph below. 10,CO3,Apply



The numbers written on edges represent the distance between the nodes while the numbers written on nodes represent the heuristic values. Let us find the most cost-effective path to reach from start state A to final state G using A* Algorithm.

20. Illustrate the working principle of a feed forward neural network with an example. 10,CO3,Apply

or

20.

Customer	Age	Income	No. Credit cd	Class
Ram	35	35	3	N
Padma	22	50	4	Y
Subodh	63	160	1	N
Madhu	59	210	1	N
Rani	25	45	4	Y
Arun	37	50	2	

10,CO3,Apply

Find the class of Arun using KNN.

Also state the Strengths and the weaknesses of KNN

:r

er

1. Let there be 12 messages of which 8 are normal and 4 are Spam. 10,CO4,Analyze

In the messages some words occer as follows:

	occurring in Normal message	occurring in Spam message
Dear	8	2
Friend	5	1
Lunch	3	0
Money	0	5

Use Naive Bayes to find out whether two massages below belong to Normal or Spam

i) message with "Dear friend" words present

ii) message with "friend money" words present

or

21. How can the traditional Missionaries and Cannibals problem be modified to include additional constraints or variables, and how would these modifications affect the difficulty and optimal solution of the problem? 10,CO4,Analyze

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Degree: **B.Tech,**

Stream: **CSE/CSE(AI)/CSBS/CSE(AIML)/CSE(IOT)/ CSE(IOTCSBT)/IT**

End Semester Examination 2023 - Fourth Semester Examination, May-2023

Paper Code: PCCCS401 Paper Name: Discrete Mathematics

Full Marks: 100 Duration: 3 Hours

Part - A

Attempt 10 questions

Each question carries 2 Marks (2 X 10)

1. Draw the Venn diagram of (A ∪ B) ∩ C — 2,CO1,Remember

or

1. When a number is divided by 36, it leaves a remainder of 19. What will be the remainder when the number is divided by 12? — 2,CO1,Remember

2. Define relatively prime integers with an example. — 2,CO1,Remember

or

2. What is the power set of the empty set? What is the power set of the set { Ø}? — 2,CO1,Remember

3. Let A = {1,3,5,7} and B={2,3,4,5} find A - B — 2,CO1,Remember

or

3. Define GCD of two integers — 2,CO1,Remember

4. Let p denote "He is rich" and let q denote "He is happy". Write each statement in symbolic form using p and q. — 2,CO2,Understand
   (i) If he is rich, then he is unhappy.
   (ii) He is neither rich nor happy.

or

4. State the product rule of counting for two sets. 2,CO2,Understand

5. Write the symbolic form and negate the following statements. 2,CO2,Understand

i) Everyone should help his neighbours, or his neighbours will not help him.

ii) Everyone agrees with someone, and someone agrees with everyone.

or

5. Is the following a tautology? Justify. 2,CO2,Understand

$(p \vee q) \rightarrow (q \wedge r)$

6. Let $S = \{1, i, -1, -i\}$, where $i^4 = 1$. Find the generators of the cyclic group, $(S, \circ)$. 2,CO3,Apply

or

6. Prove that every group contains only one identity element. 2,CO3,Apply

7. Prove that $H = \{1, -1\}$ is not a subgroup of $(\mathbb{Z}, +)$. 2,CO3,Apply

or

7. State the condition under which a semi group $(G, \circ)$ will be a group. 2,CO3,Apply

8. Find the chromatic number of a complete graph with 5 nodes. 2,CO4,Analyze

or

8. Let G be a simple graph of 6 vertices and 3 components. What are the minimum and maximum number of edges in G? 2,CO4,Analyze

9. Prove that the chromatic number of a bipartite graph is 2. 2,CO4,Analyze

or

9. What do you mean by isomorphic graphs? Explain with an example. 2,CO4,Analyze

10. A connected planar graph has 4 vertices and 5 edges. What is the chromatic number of the graph? 2,CO4,Analyze

or

10. Give an example of a graph that is Eulerian but not Hamiltonian. 2,CO4,Analyze

Part - B
Attempt 6 questions
Each question carries 5 Marks (5 X 6)

11. Let A={1,2,3,4} and R={(1,1),(1,2), (2,3), {3,2),(4,3),(3,4)}. Find the transitive closure of R 5,CO1,Remember

or

11. Let X={1,2,3,4} and R be a equivalence relation defined on X such that for all x, y ∈X, xRy if and only if x – y is divisible by 3. Find the equivalence class of 2. 5,CO1,Remember

12. Show that $(p \vee q) \wedge (\neg p \vee r) \rightarrow (q \vee r)$ is a tautology. 5,CO2,Understand

or

12. Find the number of 7 lettered words each consisting of 3 vowels and 4 consonant which can be forms using the letters of the word "DIFFERENTIATION". 5,CO2,Understand

13. For the following sets of premises, what relevant conclusion can be drawn? Explain the rules of inference used to obtain each conclusion from the premises. 5,CO2,Understand

"If I take the day off, it either rains or snows." "I took Tuesday off or I took Thursday off." "It was sunny on Tuesday." "It did not snow on Thursday."

or

13. Use resolution to show that the hypotheses "Jasmine is skiing or it is not snowing" and "It is snowing or Bart is playing hockey" imply that "Jasmine is skiing or Bart is playing hockey". 5,CO2,Understand

14. Let $H = \left\{ \begin{pmatrix} a & b \\ c & d \end{pmatrix} \mid a, b, c, d \in \mathbb{Z} \right\}$. Then, show that $(H, +)$ forms group where "$+$" represents matrix addition. 5,CO3,Apply

or

14. Describe the mathematical structure of a cyclic group with an example. 5,CO3,Apply

15. Define Abelian group. Give an example of finite non-Abelian group. [3+2] 5,CO3,Apply

or

15. Construct the composition table for $(\mathbb{Z}_5, +)$. Hence, prove that $(\mathbb{Z}_5, +)$ is a group. 5,CO3,Apply

16. A flag is to be designed with 7 horizontal stripes and 5 colours. Using the concept of graph colouring, find the number of ways can the flag be designed so that no two adjacent stripes have the same colour? 5,CO4,Analyze

or

16. Prove that number of odd vertices in any graph is even. 5,CO4,Analyze

Part - C

Attempt 5 questions

Each question carries 10 Marks (10 X 5)

17. In a survey of 60 people it is found that 25 read Newsweek magazine,26 read Time,26 read Fortune,9 read both Newsweek and Fortune,11 read both Newsweek and Time,8 read both Time and Fortune,3 read all three. 10,CO1,Remember

Find the number of people reading
(a) At least one of the three newspapers,
(b) Only one newspaper. [5+5]

or

17. What can you say about the sets A and B if we know that 10,CO1,Remember

a) $A \cup B = A$?
b) $A \cap B = A$?
c) $A - B = A$?

d) $A \cap B = B \cap A$?
e) $A - B = B - A$?

18. There are 3 different cars available to transport 3 girls and 5 boys on a field trip. Each car can hold up to 3 children. 10,CO2,Understand

   i. Find the numbers of ways in which they can be accommodated.
   ii. Find the number of ways in which they can be accommodated if 2 or 3 girls are assigned to one of the cars.

In both the cases the internal arrangement of the children inside the car is considered to be immaterial.

or

18. A shop sells 6 different flavours of ice-creams. In how many ways can a customer can choose 4 ice-cream cones if 10,CO2,Understand

   i. they are all of different flavours
   ii. they are not necessarily of different flavours
   iii. they contain only three different flavours
   iv. they contain only two or three different flavours

19. Consider two permutations f and g in S_5, given in the array form as, 10,CO3,Apply

$$f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 4 & 3 & 5 & 1 \end{pmatrix} \text{ and } g = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 4 & 1 & 2 & 3 \end{pmatrix}.$$

Compute $f \circ g$ and $g \circ f$ and verify that they are same or not.

or

19. Show that $(\mathbb{Z}_5, \cdot)$ forms a group. Then, find the units of $(\mathbb{Z}_5, \cdot)$. 10,CO3,Apply

20. In a college offering a course in which every student will have to take English and one of the following group of subjects: 10,CO4,Analyze

(i) Botany, Zoology, Microbiology

(ii) Botany, Chemistry, Zoology
(iii) Physics, Zoology, Botany
(iv) Maths, Physics, Chemistry
(v) Maths, Physics, Statistics
(vi) Maths, Statistics, Computer
(vii) Computer, Chemistry, Microbiology

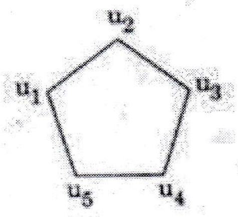
Find the period allocation in a day such that students can attend their class without any hindrance.

or

20. a) Define the following terms: parallel edge, complete graph, null graph, and connected graph, complement of a graph, simple graph. 10,CO4,Analyze

b) A non-directed graph G has 8 edges. Find the number of vertices, if the degree of each vertex in G is 2.

c) Define isomorphism. Determine whether the following pair of graphs is isomorphic.



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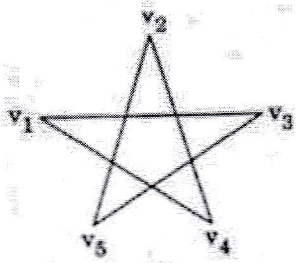
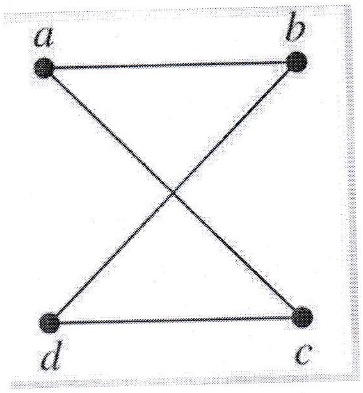


H

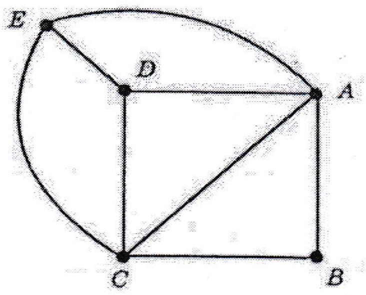
21. How many paths of length four are there from a to d of the following graph: 10,CO4,Analyze



or

21. a) Let G be a simple graph having at most 2n vertices. If the degree of every vertex of $G \geq n$, then prove that G is connected.

b) Find the chromatic number of the following graph.



10,CO4,Analyze

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End Semester Examination 2023 - Fourth Semester Examination,May-2023

Paper Code: PCCCS403 Paper Name: Operating Systems
Full Marks:100 Duration:3 Hours

Part - A

Attempt 10 questions
Each question carries 2 Marks (2 X 10)

1. Name the two permissible atomic operations in semaphore? Explain. 2,CO1,Remember

or

1. Why is the operating system important? 2,CO1,Remember

2. Give a harware solution to synchronization problem. 2,CO1,Remember

or

2. What are disadvantages of multi-processor systems? 2,CO1,Remember

3. How do you detect a deadlock in a system? 2,CO2,Understand

or

3. Define Thread? 2,CO2,Understand

4. How do threads differ from processes in operating system? 2,CO2,Understand

or

4. What is turnaround time for a process? 2,CO2,Understand

5. Why thread is called a light weight process? 2,CO2,Understand

or

5. Write difference between User level Thread and Kernel level thread 2,CO2,Understand

6. What is the difference between relocatable address and absolute address? 2,CO3,Apply

or

6. What is the difference between logical address and physical address? 2,CO3,Apply

7. What is the difference between Internal fragmentation and External fragmentation? 2,CO3,Apply

or

7. What is page offset? 2,CO3,Apply

8. What is best fit and worst fit? 2,CO3,Apply

or

8. When is a page replaced in LRU page replacement algorithm? 2,CO3,Apply

9. Why LOOK & SCAN algorithms are called Elevator algorithms? 2,CO4,Analyze

or

9. What does 0 and 1 represent in Bit Table? 2,CO4,Analyze

10. What do you understand by disk access time? 2,CO4,Analyze

or

10. What is Indexed file allocation method? 2,CO4,Analyze

Part - B

Attempt 6 questions

Each question carries 5 Marks (5 X 6)

11. Differentiate between a single threaded and a multithreaded process. 5,CO1,Remember

or

11. Describe the roles played by Loader and Linker. 5,CO1,Remember

12. Distinguish between deadlock prevention and deadlock avoidance. 5,CO2,Understand

or

12. In a batch environment, following is the sequence of CPU and I/O timing of two processes. Process 1 will be followed by Process 2. 5,CO2,Understand

PROCESS 1:

20ms CPU

50ms I/O

10ms CPU

70ms I/O

15ms CPU

PROCESS 2:

30ms CPU

60ms I/O

70ms CPU

What will be the sequence if these two processes are executed in a Multiprogramming environment?

13. Explain First fit,Best fit,Worst fit and Next fit memory allocation scheme. 5,CO2,Understand

or

13. A counting semaphore S is initialized to 10. Then, 6 P(Wait) operations and 4 V(Signal) operations are performed on S. What is the final value of S? Show the working. 5,CO2,Understand

14. Draw and describe a Process Control Block. 5,CO3,Apply

or

14. Consider the memory access time to be 400 ms. TLB access time to be 50 ms. the hit percentage is 90%. Calculate the Average Access Time. Compare average memory access time without TLB. 5,CO3,Apply

15. With proper diagram explain how SPOOLING works. 5,CO3,Apply

or

15. Differentiate between Contiguous allocation and Linked allocation. 5,CO3,Apply

16. Discuss the advantages of maintaining directories. 5,CO4,Analyze

or

16. Illustrate response time, arrival time, turnaround time and waiting time in context to process scheduling with appropriate examples. 5,CO4,Analyze

Part - C
Attempt 5 questions
Each question carries 10 Marks (10 X 5)

17. Elaborate on the different system call services in a typical operating system. 10,CO1,Remember

or

17. How fork() system call works? Explain with a proper example. 10,CO1,Remember

18. Consider the snapshot of a system 10,CO2,Understand

	Max	Allocation	Available
	A B C D	A B C D	A B C D
P0	2 0 0 1	4 2 1 2	3 3 2 1
P1	3 1 2 1	5 2 5 2	
P2	2 1 0 3	2 3 1 6	

F

P3	1 3 1 2	1 4 2 4
P4	1 4 3 2	3 6 6 5

a) Is the system safe? If so derive the safe sequence.

b) A new request from process P1 arrives for(1,1,0,0) . Can the request be granted immediately? Explain.

or

18. 10,CO2,Understand

Process Id	Arrival time	Burst time	Priority
P1	0	8	3
P2	1	4	3
P3	2	5	4
P4	3	3	4
P5	4	1	5

If the CPU scheduling policy is priority preemptive, calculate the average waiting time and average turn around time. (Higher number represents higher priority)

19. Discuss the methods of recovering from deadlock in detail. Outline the advantage and disadvantage of each of the methods. 10,CO2,Understand

or

19. Demonstrate overflow and underflow condition in Producer-Consumer Problem and illustrate its solution using semaphore with proper example. 10,CO2,Understand

20. Consider method used by process P1 and P2 for accessing critical section. The initial values of shared Boolean variables S1 and S2 are randomly selected. 10,CO3,Apply

```
P1()                                P2()
{                                   {
```

```
While (S1==S2);                  While(S1!=S2);

critical section                 critical section

S1=S2;                           S1=not (S2);
```

Which of the following is true? Give proper explanation.

a. Mutual exclusion + Progress
b. Mutual exclusion only
c. Progress only
d. None

or

20. What do you mean by system calls? What is the purpose of system calls? 10,CO3,Apply

21. Consider the set of 5 processes whose arrival time and burst time are given below- 10,CO4,Analyze

ID	Arrival time	Burst time
P1	3	4
P2	5	3
P3	0	2
P4	5	1
P5	4	3

If the CPU scheduling policy is FCFS, calculate the average waiting time and average turn around time.

or

21. Consider an imaginary disk with 51 cylinders. A request comes in to read a block on cylinder 11. While the seek to cylinder 11 is in progress, new requests come in for cylinders 1, 36, 16, 34, 9 and 12 in that order. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves, to satify all the pending requests, for each of the following disk scheduling algorithms: FCFS, SSTF, SCAN & LOOK? 10,CO4,Analyze

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Degree:**B.Tech,**
Stream:**CSE/CSE(AI)/CSBS/CSE(AIML)/CSE(IOT)/ CSE(IOTCSBT)/IT/ECE/EEE**

End Semester Examination 2023 - Fourth Semester Examination,May-2023

Paper Code: MC401 Paper Name: Environmental Sciences
Full Marks:100 Duration:3 Hours

Part - A

Attempt 10 questions
Each question carries 2 Marks (2 X 10)

1. The depletion of the Ozone layer in the Antarctic region is seasonal. Justify. 2,CO1,Remember

or

1. Define solid waste management. 2,CO1,Remember

2. Distinguish between RSPM and SPM. 2,CO1,Remember

or

2. Haemoglobin has a greater affinity for carbon monoxide than carbon dioxide. Discuss. 2,CO1,Remember

3. Discuss the Wein Displacement's law. 2,CO1,Remember

or

3. State the types of solid waste? 2,CO1,Remember

4. In how many categories can resources be classified? Name them. 2,CO1,Remember

or

4. In the Mesosphere temperature decreases with height. State the reasons behind it. 2,CO1,Remember

5.	State how humans are responsible for changes in climate.	2,CO1,Remember
	or	
5.	What is logistic growth of population?	2,CO1,Remember
6.	What is particulate matter?	2,CO2,Understand
	or	
6.	What is the time taken for completion of BOD reaction rate?	2,CO2,Understand
7.	What is the composition of biodegradable waste in Municipal Solid Waste (MSW) of India?	2,CO2,Understand
	or	
7.	Identify any one harmful effect of aerosol on the environment.	2,CO2,Understand
8.	Acid rain affects the atmosphere. Discuss briefly.	2,CO2,Understand
	or	
8.	Name the most important elements causing algal bloom?	2,CO2,Understand
9.	Discuss the effect of Arsenic on human health.	2,CO2,Understand
	or	
9.	What is greenhouse effect?	2,CO2,Understand
10.	What are the effects of greenhouse gases on global climate?	2,CO2,Understand
	or	
10.	How do you dispose off the hospital waste?	2,CO2,Understand

Part - B

Attempt 6 questions

Each question carries 5 Marks (5 X 6)

11.	Discuss the importance of logistic growth model.	5,CO2,Understand
	or	
11.	Discuss volatile organic compounds with suitable examples.	5,CO2,Understand

12.	Differentiate between ex-situ conservation and in-situ conservation.	5,CO2,Understand
	or	
12.	Describe the toxicity of heavy metals with two examples.	5,CO2,Understand
13.	Briefly describe the Shelford's law of tolerance with suitable examples justifying the law.	5,CO2,Understand
	or	
13.	Discuss the significance of carrying capacity.	5,CO2,Understand
14.	Discuss Kyoto Protocol.	5,CO3,Apply
	or	
14.	Discuss genetic diversity.	5,CO3,Apply
15.	Discuss in detail about tertiary water treatment.	5,CO3,Apply
	or	
15.	The Biogeochemical cycles are integral part of the ecosystem. Justify.	5,CO3,Apply
16.	Sustainable development is necessary. Justify.	5,CO3,Apply
	or	
16.	Briefly discuss environmental impact assessment.	5,CO3,Apply

Part - C

Attempt 5 questions

Each question carries 10 Marks (10 X 5)

17.	"Throughout the ecosystem, nutrients are recycled but the energy flow is unidirectional". Justify.	10,CO4,Analyze
	or	
17.	Implementing the Stefan's law, prove that the earth's surface temperature is -19 degree Celsius.	10,CO4,Analyze

18. 6 ml of wastewater is diluted to 3XX ml (put the last two digits of your class Roll no in place of XX here) distilled water in standard BOD bottle. 10,CO4,Analyze

Initial DO in bottle is determined to be 8.5 mg/l. DO after 5 days at 20^0C is found to be 5 mg/ l. Determine BOD5 of wastewater and compute the ultimate BOD.

or

18. Prove that maximum sustainable yield will be obtained when population is half the carrying capacity. 10,CO4,Analyze

19. Summarize different processes of controlling noise pollution. 10,CO4,Analyze

or

19. State the reason as to why the value of BOD is less than that of COD. Also reason out why the value of BOD is less than the theoretical oxygen demand. [5+5] 10,CO4,Analyze

20. A dry air packet at a surface has a temperature of 45 degree Celsius with a dew point of 25 degree Celsius. If the air packet moves adiabatically, what will be the air temperature at a height 5000metres from the surface? DALR= -10degree Celsius/km and SALR= -8 degree Celsius/km. 10,CO4,Analyze

or

20. Describe in detail the process of physical and chemical process of disposal. 10,CO4,Analyze

21. The BOD5 of a wastewater is determined to be 420 mg/ l at 20 ° C. The k value at 20 ° C is known to be 0.23 per day. What should be the BOD value if tests were run at 15 ° C? 10,CO4,Analyze

or

21. Consider the Sun as a perfect sphere of radius 6.8×10^{8}m. Calculate the energy radiated by the sun in 24 hours. Surface temp. of the Sun =6200K, Stefan's constant= 6.8×10^{-8}J/m^2SK^{-4}. 10,CO4,Analyze

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End Semester Examination 2023 - Fourth Semester Examination,May-2023

Paper Code: PCCCS404 Paper Name: Design & Analysis of Algorithms

Full Marks:100 Duration:3 Hours

Part - A

Attempt 10 questions
Each question carries 2 Marks (2 X 10)

1. Write down the advantages of the Master Theorem. 2,CO1,Remember

or

1. When will a recurrence relation fall into Case 2 of Master Theorem? 2,CO1,Remember

2. To solve the Tower of Hanoi problem, create a recursive function. 2,CO1,Remember

or

2. Sort the following according to their asymptotic complexity (in non-decreasing order): 2,CO1,Remember
$n^{1/2}$, $\log n$, 100^n, $50^n + 2^n$, $5n^2 + 7n \log n + 10^{100}$.

3. Write down the time complexity of merging two sorted sub arrays. 2,CO2,Understand

or

3. What is the time complexity of the greedy algorithm used in the fractional knapsack problem? 2,CO2,Understand

4. What is the objective of the job sequencing problem with deadline? 2,CO2,Understand

or

4. Define in place sorting. 2,CO2,Understand

5. What is the main drawback of the greedy algorithm used in the fractional knapsack problem? 2,CO2,Understand

or

5. State a real-world application of the N-Queen problem. 2,CO2,Understand

6. Can the greedy algorithm always find the optimal coloring for a given graph? 2,CO3,Apply

or

6. How can the N-Queens problem be extended to a generalized version with different board sizes and numbers of queens? 2,CO3,Apply

7. Write down the time complexity for the Subset Sum problem using backtracking. 2,CO3,Apply

or

7. What algorithmic strategy is used in Dijkstra's shortest path algorithm? 2,CO3,Apply

8. Discuss the limitations of the Bellman-Ford algorithm. 2,CO3,Apply

or

8. Write down the algorithmic statergy used in Bellman Ford algorithm. 2,CO3,Apply

9. Give an example to show a greedy graph coloring algorithm does not always provide an optimal solution. 2,CO3,Apply

or

9. How does backtracking work in the subset sum problem? 2,CO3,Apply

10. State the Max Flow Min cut theorem for network flow. 2,CO4,Analyze

or

10. How Branch and bound approach differs from backtracking? 2,CO4,Analyze

Part - B

Attempt 6 questions

Each question carries 5 Marks (5 X 6)

11. Find the running time of the following program: 5,CO1,Remember

```
function(int n){
for(int i=1; i<=n; i++)
for(int j=1; j<=n; j*=2)
printf("*");
}
```

or

11. Justify n! = O(n^n). 5,CO1,Remember

12. Explain the Fractional Knapsack problem and provide a step-by-step approach to solve it using a Greedy Algorithm. What is the time complexity of the algorithm? 5,CO2,Understand

or

12. Derive state space tree for LIFO branch and bound. 5,CO2,Understand

13. Derive state space tree for FIFO branch and bound. 5,CO2,Understand

or

13. Write down the algorithm to merge two sorted arrays. 5,CO2,Understand

14. Describe Floyd-Warshall algorithm and derive its time complexity. 5,CO3,Apply

or

14. Which approach should we consider when choosing between the top-down approach and the bottom-up approach solutions for the same problem? Explain with an example. 5,CO3,Apply

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15. Show how the dynamic programming approach can be used to resolve matrix chain multiplication problems. 5,CO3,Apply

or

15. In cartography, graph coloring is used to color the regions of a map such that adjacent regions have different colors. Show using an example scenario with at least 8 regions, how this problem can be modeled using graph coloring problem. 5,CO3,Apply

16. Describe the advantages of branch and bound over brack tracking. How a maximization problem is solved using branch and bound? 5,CO4,Analyze

or

16. Prove that 3-CNF SAT problem is NP. 5,CO4,Analyze

Part - C

Attempt 5 questions

Each question carries 10 Marks (10 X 5)

17. Find the asymptotic upper bound of the following recurrence relation with the help of the Recursion Tree method: 10,CO1,Remember
$T(n) = T(n/4) + T(n/2) + O(n^2)$.

or

17. Find the time complexity of the following recurrence relations using the Recursion Tree method: 10,CO1,Remember
$T(n) = 3T(n/4) + O(n^2)$.

18. Explain how the Fractional Knapsack algorithm can be modified to solve the 0/1 Knapsack problem. Provide an example scenario and explain how you would solve it using the modified algorithm. 10,CO2,Understand

or

18. Discuss merge sort algorithm with an example. Explain the time complexity of merge sort. 10,CO2,Understand

19. Consider a city with multiple intersections that have traffic lights. Each traffic light controls the flow of traffic for a particular 10,CO3,Apply

direction. The traffic lights at different intersections should be coordinated in a way that minimizes traffic congestion and delays. Show how graph coloring problem can be used to solve this problem

or

19. Consider the following variation of the subset sum problem: given a set of integers S = $\{a_1, a_2, ..., a_n\}$, find a subset T of S such that the sum of the elements of T is as close as possible to a target integer k, without exceeding it. If there are multiple subsets that achieve the same closeness to k, choose the one with the minimum elements.
Describe an algorithm to solve this problem. Analyze the complexity of your algorithm. 10,CO3,Apply

20. Using the dynamic programming approach, find whether a solution exists or not to the Subset Sum Problem for the set of integers {2, 3, 7, 8, 10} and a target sum of 14. Show your work step by step and explain the time complexity of your algorithm. 10,CO3,Apply

or

20. Why Dijkstra's algorithm fails with negative edge weight? Explain with an example. How Bellman Ford algorithm overcome this disadvantage of Dijkstra's shortest path algorithm? Explain with an example. 10,CO3,Apply

21. Compare Dijkstra's Algorithm and Bellman Ford Algorithm with proper example. How to detect negative cycle in a directed graph? 10,CO4,Analyze

or

21. Solve the 8-puzzle problem using branch and bound. 10,CO4,Analyze

1	2	3
4	8	-
7	6	5

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Degree:**B.Tech,**
Stream:**CSE/CSE(AI)/CSBS/CSE(AIML)/CSE(IOT)/ CSE(IOTCSBT)/IT**

End Semester Examination 2023 - Fourth Semester Examination,May-2023

Paper Code: PCCCS402 Paper Name: Computer Organization & Architecture

Full Marks:100 Duration:3 Hours

Part - A

Attempt 10 questions
Each question carries 2 Marks (2 X 10)

1. What do you mean by LOAD and STORE instructions? 2,CO1,Remember

or

1. Explain micro instruction format using example. 2,CO1,Remember

2. Write the structure of buses used in a computer system. 2,CO1,Remember

or

2. Compare and contrast a serial adder and a parallel adder. 2,CO1,Remember

3. Write the differentiate between Primary storage and secondary storage. 2,CO2,Understand

or

3. What is the use of temporary register (TR)? 2,CO2,Understand

4. A 2 byte long assembly language instruction BR 09 (branch instruction) stored at location 1000 (all no. are in HEX). What is the effective address that the PC holds? 2,CO2,Understand

or

4. Convert the hexadecimal no.s into Decimal no.s. 2,CO2,Understand
   a) 7A
   b) 1F

c) 13C

5. The main memory of a computer has 2 cm blocks while the cache has 2c blocks. If the cache uses the set associative mapping scheme with 2 blocks per set, then block k of the main memory maps to the set- 2,CO3,Apply

A. (k mod m) of the cache
B. (k mod c) of the cache
C. (k mod 2 c) of the cache
D. (k mod 2 cm) of the cache

or

5. Write in brief about the necessity of cache memory mapping. 2,CO3,Apply

6. Name the memory acts as buffer between main memory and processor. 2,CO3,Apply

or

6. Consider a direct mapped cache of size 16 KB with block size 256 bytes. The size of main memory is 128 KB. Find-Number of bits in tag and Tag directory size. 2,CO3,Apply

7. Describe Cache Memory and its future. 2,CO3,Apply

or

7. Consider a direct mapped cache of size 512 KB with block size 1 KB. There are 7 bits in the tag. Find-Size of main memory and Tag directory size. 2,CO3,Apply

8. Consider a pipeline having 4 phases with duration 60, 50, 90 and 80 ns. Given latch delay is 10 ns. Calculate- the pipeline cycle time 2,CO4,Analyze

or

8. Which hazard occurs if the read takes place before the write operation is complete and why? 2,CO4,Analyze

9. If the greedy cycles are (3),(7) and (1,8) What will be the Minimum average latency? 2,CO4,Analyze

or

9. What is Pipelining? 2,CO4,Analyze

10. What is forbidden latency? Give example. 2,CO4,Analyze

or

10. What are pipeline optimization techniques? 2,CO4,Analyze

Part - B
Attempt 6 questions
Each question carries 5 Marks (5 X 6)

11. Explain Booth's algorithm for the multiplication of signed two's complement numbers. 5,CO1,Remember

or

11. Compare microinstruction and microprogram with examples. 5,CO1,Remember

12. Compare the advantages and disadvantages of using binary arithmetic in computer systems compared to other number systems. 5,CO1,Remember

or

12. Write the sequence of control signals to perform ADD R3, (R2), R1 where R1, R2 and R3 are general purpose registers. Here, R3 is the destination operand, R1 is source operand and the content of R2 stores the address of a memory location where the another operand is stored. Here, ADD R3, (R2), R1 is a two word instruction. 5,CO1,Remember

13. Write down the relation between the instruction cycle, machine cycle, and T states. 5,CO2,Understand

or

13. What is overflow problem in fixed point number representation? 5,CO2,Understand

14. Explain on the similarities and dissimilarities between RAM and ROM designs using relevant block diagrams. 5,CO3,Apply

or

14. Draw the block diagram for 8M X 32 memory using 512K X 8 memory chips. 5,CO3,Apply

15. Suppose the time period of the four stages of a pipeline are τ1=60ns, τ2=70 ns, τ3=90ns and τ4=80 ns respectively and the interface latch has a delay τ d= 10ns. Then 5,CO4,Analyze

i) What would be the clock frequency of the above pipeline?

ii) What is the speed up of the pipeline over its equivalent non-pipeline Counterpart?

or

15. Assume a 4 segment pipeline system with a clock cycle of 20 nano seconds required in each segment to execute 100 tasks in sequence. What is the speedup ratio? 5,CO4,Analyze

16. Consider the following instructions- 5,CO4,Analyze

I1: R1=100

I2: R1=R2+4

I3: R2=R4+25

I4: R4=R1+R3

I5: R1=R1+30

Calculate sum of (WAR,RAW and WAW) dependencies for the above instructions.

or

16. Analyze floating point arithmetic operations with an example. 5,CO4,Analyze

Part - C

Attempt 5 questions

Each question carries 10 Marks (10 X 5)

17. Write the sequence of control steps required for the single bus architecture for each of the following instructions: (i) Add the (immediate) number NUM to register R1. (ii) Add the contents of memory location NUM to register R1. (iii) Add the contents of memory location whose address is at memory location NUM to register R1. Assume that each instruction consists of two 10,CO1,Remember

words. The first word specifies the operation and the addressing mode, and the second word contains the number NUM.

or

17. Consider a two-level logic implementation of the look-ahead carry generator. Assume that all P_i and G_i are available for the carry generator circuit and that the AND and OR gates can have any number of inputs. Find out the number of AND gates and OR gates needed to implement the look-ahead carry generator for a 4-bit adder with S3, S2, S1, S0 and C4. 10,CO1,Remember

18. Explain in detail different types of addressing modes with an example for each. 10,CO2,Understand

or

18. Draw and describe IEEE 754 single precision format. 10,CO2,Understand

19. With examples explain the Data transfer, Logic, and Program Control Instructions. Discuss Memory Reference Instructions. 10,CO2,Understand

or

19. Find out the effective address and content of the AC in each of the following cases(content of PC=1500, content of IR=2,AC=0) 10,CO2,Understand

Address	Memory Content
1500	ADD 1504
1502	50
1504	1508
1506	20
1508	40

1. Direct addressing mode
2. Indirect addressing mode
3. Indexed addressing mode
4. Immediate addressing mode

20. Suppose you are given RAM chips each of size 256 x 4. Design a 2 K x 8 RAM system using these chips as the building block. Draw a neat logic diagram of your implementation. 10,CO3,Apply

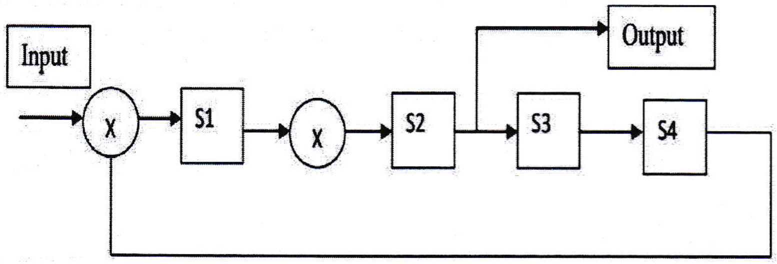
or

20. A computer has a main memory of 64 Kx16 and a cache memory of 1 K words. The cache uses direct mapping with a block size of 4 words. a) Find the no of bits required for word offset, cache index and tag? b) How many bits are there in each word of the cache? c) How many blocks can the cache accommodate? 10,CO3,Apply

21. The stage delays in a 4 stage pipeline are 800, 500, 400 and 300 picoseconds. The first stage is replaced with a functionally equivalent design involving two stages with respective delays 600 and 350 picoseconds. How much the throughput will increase (in percentage)? 10,CO4,Analyze

or

21. Consider the four stage pipelined processor specified by the following diagram 10,CO4,Analyze



The pipeline has a total evaluation time of six clock cycles all successor stages must be used after each clock cycle.

a) Specify the reservation table for above pipelined processor with six columns and four rows

b) What are the forbidden latencies and the initial collision vector?

c) Draw the state transition diagram.

d) Write down the simple cycles and Greedy cycle.

e) Evaluate MAL Value.

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Degree:**B.Tech**,
Stream:**CSE/CSE(AI)/CSBS/CSE(AIML)/CSE(IOT)/ CSE(IOTCSBT)/IT**

End Semester Examination 2023 - Fourth Semester Examination,May-2023

Paper Code: HSMC401 Paper Name: Management 1 (Organizational Behaviour)

Full Marks:100 Duration:3 Hours

Part - A

Attempt 10 questions

Each question carries 2 Marks (2 X 10)

1.	A good manager is a friend. Do you agree? Explain.	2,CO1,Remember
	or	
1.	Define Leadership.	2,CO1,Remember
2.	What is re-engineering in organisational behavior?	2,CO1,Remember
	or	
2.	Mention the reasons for forming a group.	2,CO1,Remember
3.	Define bureaucracy.	2,CO1,Remember
	or	
3.	Give two examples of a command group.	2,CO1,Remember
4.	Why is the study of attitude necessary for organizational behaviour?	2,CO1,Remember

or

4. State two classifications of formal group. 2,CO1,Remember

5. Explain Group think. 2,CO1,Remember

or

5. Give an example of a successful manager you know in real life. 2,CO1,Remember

6. Explain Behavioral Leadership. 2,CO2,Understand

or

6. How would you explain a family value system? 2,CO2,Understand

7. Is improving your innovativeness going to help you as an employee in an organisation? Explain your answer. 2,CO2,Understand

or

7. Why is organisational behavior a science as well as an art? 2,CO2,Understand

8. List out the current issues in communication. 2,CO2,Understand

or

8. How important is it for a manager to be a counselor at certain situations? 2,CO2,Understand

9. State one significant role of a manager in an organisation. 2,CO2,Understand

or

9. Explain the concept of attitude. 2,CO2,Understand

10. Explain the concept of perception. 2,CO2,Understand

or

10. Explain the decision making function of groups in an organization. 2,CO2,Understand

Part - B

Attempt 6 questions

Each question carries 5 Marks (5 X 6)

11. Analyse the need and significance of a sound organizational design in the successful running of an organisation? 5,CO1,Remember

or

11. What are the three levels in which organizational behavior is implemented? 5,CO1,Remember

12. Analyse how environmental factors play a major role in defining one's personality. 5,CO2,Understand

or

12. Evaluate what causes positive work attitude? 5,CO2,Understand

13. Mention the features of personality and discuss. 5,CO2,Understand

or

13. Elaborate the factors influencing Perception. 5,CO2,Understand

14. Write a short note on negotiation. 5,CO3,Apply

or

14. Demonstrate the concept of Group cohesiveness with examples. 5,CO3,Apply

15. Illustrate the differences between formal and informal groups. 5,CO3,Apply

or

15. What is a two way communication? What are its features? 5,CO3,Apply

16. Discuss the purpose of organizational Structure. 5,CO4,Analyze

or

16. Analyse the impact of technology in organizational behavior. 5,CO4,Analyze

Part - C

Attempt 5 questions

Each question carries 10 Marks (10 X 5)

17. Explain basic Model Of Communication. 10,CO2,Understand

or

17. Discuss how motivation of an individual is significant in organisational behaviour. 10,CO2,Understand

18. Discuss the key factors in organizational design in detail. 10,CO3,Apply

or

18. Mention the different types of Social Communication Barriers with examples of each. 10,CO3,Apply

19. Briefly explain the different objectives of communication. 10,CO3,Apply

or

19. Explain different Psychological Communication Barriers with instances. 10,CO3,Apply

20. Analyse how managing workforce diversity along with empowering people are one of the most difficult jobs to do in an organisation. 10,CO4,Analyze

or

20. Explain the five conflict management style. Also, highlight situations where each style is useful. 10,CO4,Analyze

21. Define interpersonal conflict. Explain the different types of Conflicts. 10,CO4,Analyze

or

21. Assess the various phases of group development. 10,CO4,Analyze

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Degree:**B.Tech**,
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End Semester Examination 2023 - Fourth Semester Examination,May-2023

Paper Code: BSC401 Paper Name: Mathematics - IV

Full Marks:100 Duration:3 Hours

Part - A

Attempt 10 questions
Each question carries 2 Marks (2 X 10)

1. "Curve fitting is always linear." Justify the statement — 2,CO1,Remember

or

1. If $L\{f(t)\}=F(s)$, then what will be the result for $L\{tf(t)]$? [s being the transform variable.] — 2,CO1,Remember

2. What is the difference between curve fitting and interpolation? — 2,CO1,Remember

or

2. When the origin is shifted for fitting a straight line by pairs of observations then what will be the effects on the values of a and b? — 2,CO1,Remember

3. What are the three normal equations used in fitting a parabola? — 2,CO1,Remember

or

3. The equation of a geometric curve is expressed in the form $Y=A+Bx$, then write the values of Y, A and B in terms of y, a and b. — 2,CO1,Remember

4. What do you mean by SRSWR? 2,CO2,Understand

or

4. What do you mean by SRSWOR? 2,CO2,Understand

5. What is an unbiased estimator? 2,CO2,Understand

or

5. Give the definition of statistic. 2,CO2,Understand

6. Write the critical region for testing hypothesis at 5% level. 2,CO3,Apply

or

6. In order to test whether a coin is perfect, it is tossed 5 times. The null hypothesis of perfectness is rejected if more than 4 heads are obtained. What is the probability of Type I error? Find the probability of Type II error when the corresponding probability of head is 0.2. 2,CO3,Apply

7. "Null hypothesis is the complement of the alternative hypothesis." Is the statement true? 2,CO3,Apply

or

7. A random sample of 100 observations produced a sample mean of $\bar{x}= 92.4$ and $s = 25.8$. Estimate the value of the standard error of $\bar{x}$. 2,CO3,Apply

8. In large sample test, is there any restriction on sample size? 2,CO3,Apply

or

8. Demonstrate the procedure for testing the hypothesis (For two-tailed test). 2,CO3,Apply

9. Does the linearity property hold for Inverse Laplace Transform? If yes, state the property. 2,CO4,Analyze

or

9. Find the Laplace Transform of the function 2,CO4,Analyze

$t^2 u(t-4)$,

where $u(t-4)$ represents the unit step function.

10. Evaluate $\mathcal{L}\{t^n e^{at}\}$. 2,CO4,Analyze

or

10. Using Convolution theorem, find 2,CO4,Analyze

$$L^{-1}\left\{\frac{1}{s\left(s^2+1\right)}\right\}.$$

Part - B

Attempt 6 questions

Each question carries 5 Marks (5 X 6)

11. Find a second degree parabola to fit the following data: 5,CO1,Remember

x	1	2	3	4	5
y	2	3	7	16	10

or

11. Find the best fit straight line for the following data: 5,CO1,Remember

X	10	20	30	40
Y	5	11	16	18

12. A population consist of 4 observations 2,4,6,8. Consider all possible samples of size 2 which can be drawn from the observations with replacement. Compute the probability distribution table of sampling distribution of mean and hence find it's expectation. 5,CO2,Understand

or

12. On the basis of a random sample find the maximum likelihood estimator of the parameter of a Poisson distribution. 5,CO2,Understand

13. A population consist of 3 observations 2,4,6. Consider all possible samples of size 2 which can be drawn from the observations without replacement. Compute the probability distribution table of sampling distribution of mean and hence find it's expectation. 5,CO2,Understand

or

13. Suppose we have a random sample $X_1, X_2, \ldots, X_n$ where $X_i=0$ if a randomly selected student does not own a sports car, and $X_i=1$ if a randomly selected student does own a sports car. Assuming that the X_i are independent Bernoulli random variables with unknown parameter p, find the maximum likelihood estimator of p. Note that the probability mass function of a Bernoulli distribution is given by $P(X = x_i) = p^{x_i}(1-p)^{1-x_i}$ 5,CO2,Understand

14. A dice was thrown 400 times and ‘six’ resulted 80 times. Do the data justify the hypothesis of an unbiased dice? 5,CO3,Apply

Given that $P\,(Z > 1.96) = 0.025$.

or

14. The mean breaking strength of the cables supplied by a manufacturer is 1800 with a standard deviation 100. By a new technique in the manufacturing process it is claimed that the breaking strength of the cables have increased. In order to test the claim a sample of 50 cables is tested. It is found that the mean breaking strength is 1850. Can we support the claim at 1% level of significance? 5,CO3,Apply

Given that $P\,(Z > 2.33) = 0.05$.

15. Find the Laplace Transform of the following periodic function with period 2c : 5,CO4,Analyze

$$f(t) = \begin{cases} t & for \quad 0 < t < c \\ 2c - t & for \quad c < t < 2c \end{cases}.$$

or

15. Find the Fourier cosine transform of $f(x) = 5e^{-2x} + 2e^{-5x}$. 5,CO4,Analyze

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16. Find $L^{-1}\left\{\frac{a^2}{s(s+a)^3}\right\}$. 5,CO4,Analyze

or

16. Evaluate $\int_0^{\infty} e^{-3t}\sin t\cos t\,dt$, using Laplace transform. 5,CO4,Analyze

Part - C

Attempt 5 questions

Each question carries 10 Marks (10 X 5)

17. Fit the curve $pv^{\gamma} = k$ to the following data: 10,CO1,Remember

$p(kg/cm^2)$	0.5	1	1.5	2	2.5	3
$v(litres)$	1620	1000	750	620	520	460

or

17. Fit a parabola to the given data regarding *x* as the independent variable: 10,CO1,Remember

x	0	1	2	3	4	5
y	1	1.8	3.3	4.5	6.3	7.8

18. By the method of least square, find the curve $y = a + bx + cx^2$ that best fits the following data: 10,CO1,Remember

X	0	1	2	3
Y	1	0	3	4

or

18. Fit the geometric curve of the form $y = ax^b$ to the following data: 10,CO1,Remember

x	1	2	3	4	5
y	3	48	243	768	1875

19. Show that, the sample variance is a biased estimator of population variance. 10,CO2,Understand

or

19. A population consist of 4 observations 3,7,11,15. Consider all possible samples of size 2 which can be drawn from the population. 10,CO2,Understand
1. Calculate population mean.
2. Calculate population S.D.
3. Calculate the mean of the sampling distribution mean.
4. Calculate the S.D. of sampling distribution mean.

20. A sample of 100 tyres is taken from a lot.The mean life of tyres is found to be 39,350 kms. with a standard deviation of 3,260.Could the sample come from a population with mean life of 40,000 kms? Establish 99% confidence limits within which the mean life of tyre is expected to lie. [8 + 2] 10,CO3,Apply

or

20. For a large lot of freshly minted coins a random sample of size 50 is taken. The mean weight of coins in the sample is found to be 28.57 gm. Assuming that the population standard deviation of weight is 1.25 gm., will it be reasonable to support that the population mean is 28 gm? Test at 5% and 1% level of significance.] [5 + 5] 10,CO3,Apply

21. Evaluate the Fourier sine transform of $f(x) = \frac{e^{-ax}}{x}$. 10,CO4,Analyze

or

21. State and prove the second shifting property of Laplace Transform. Hence find the Laplace Transform of the following function: 10,CO4,Analyze

$$f(t)\begin{cases} 4 & for\quad 0 < t < 1 \\ -2 & for\quad 1 < t < 3 \\ 5 & for\quad t > 3 \end{cases}$$

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(Please Use Ball Pen Only)

End Semester Examination
2023 Fourth Semester
Examination,May-2023

PAPER NAME: Essential Studies For professionals-IV

Full Marks: 100

COURSE NAME : B.Tech
STREAM : All
SEMESTER : IV

PAPER CODE : HSMC402

Time: 3 Hour

Do not write anything inside this box

(To be filled by the Candidate)

Stream: ____________________

Paper: ____________________

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Paper Code: ____________________

THIS IS A QUESTION PAPER BOOKLET

- Students are instructed to write the answers in the box provided in front of each questions.
- Only write the correct options in the box provided.
- Do not mark the answers in the Questions, else marks won't be given.

TOTAL MARKS	

Total in Words : ____________________

____

Signature of Examiner

Signature of Scrutineer

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Do not write anything inside this box

To be filled by the Candidate)

Stream: ____________________

Paper: ____________________

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Paper Code: ____________________

Name of the Student: ____________________

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Date of Examination ____________________

Enrolment No. :

MAKAUT Registration No.: ____________________

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of 20____________**20**____________

Full Signature of Student

Signature of Invigilator

Signature of Officer – in -Charge

INSTRUCTIONS TO THE CANDIDATE

1. **Candidates are required to produce the Admit Card and Registration Certificate during examination.**
2. Carefully read the instructions given below and at the top of your question paper before answering.
3. **Write your Name and Enrolment No.** in the space provided on Answer booklet. *Do not write your name or put any special mark in the answer book* (except where they are needed) that may disclose your identity. Any violation in this regard may cause disqualification.
4. While signing the attendance Sheet, enter the booklet's number in the space provided.
5. *No mark/seal/ Writing should left on the confidential part of the top sheet.* Any violation may lead disqualification,
6. Any candidate found copying, helping others in any unfair means and indulging in improper behavior towards official that may disturb others in the examination hall will be subject to disciplinary action under relevant rules of the University.
7. **Using mobile phones & any calculators are strictly prohibited during ESP-SDP, GS & CA exams and Competitive Aptitude training exams (CAT), only B.Tech students who are writing ESP-V, ESP-VI & ESP-VII are allowed to use non programmable calculators.**
8. You should return the answer book to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, which will lead disqualification.
9. Rough Work, if necessary, is to be done in this book only. Cross it through properly.

No additional sheets are to be used and no loose paper will be supplied.

ATTEMPT ANY 100 QUESTIONS. EACH QUESTION CARRIES 1 MARK

Q. NO.	QUESTIONS	CORRECT OPTION
1	Al-Beruni came to India in A. 9th century A.D. B. 10th century A.D. C. 11th century A.D. D. 12th century A.D.	
2	The first Muslim invasion of India was led by- A. Mahmood Gazni B. Muhammed-Bin-Qasim C. Muhammed Ghori D. Qutubuddin Aibak	
3	Muhammad bin Qasim, who was the first Muslim to have successfully invaded Sindh in 712 AD was co.mmander of which caliphate? A. Rashidun Caliphate B. Ummayid Caliphate C. Fatimid Caliphate D. Ottoman Caliphate	
4	Who among the following was the founder of Ghaznavid dynasty? A. Ismail B. Sabuktagin C. Mahmud D. Alaptigin	
5	Firdausi, the author of Shahnama was associated with the court of_______. A. Alaptagin B. Muhammad Ghori C. Mahmud Ghazanavi D. Subuktagin	
6	In which battle Muhammad Ghori defeated Jaichand? A. Battle of Kannauj (1194 A.D.) B. Battle of Chandawar (1194 A.D.) C. Battle of Tarain (1192 A.D.) D. Battle of Tarain (1191 A.D.)	

7	Muhammad Ghori granted first Iqta in India to________. A. Nazir-ud-din Qubacha B. Shamsuddin Iltutmish C. Qutbuddin Aibak D. Tajuddin Yalduj	
8	Which slave of Muhammad Ghori conquered Bengal and Bihar? A. Yaldauj B. Bakhtiyar Khalji C. Iltutmish D. Qutbuddin Aibak	
9	Arrange the following names chronologically and select correct answer from the code given below. 1. Genghis Khan 2. Mahmud Ghaznavi 3. Muhammad Ghori 4. Taimur A. 2, 3, 1, 4 B. 3, 4, 1, 2 C. 4, 1, 2, 3 D. 1, 2, 3, 4	
10	The word 'Hindu' as reference to the people of Hind (India) was first used by _________. A. The Arabs B. The Chinese C. The Romans D. The Greeks	
11	Which Sultan of Delhi Sultanate is known as 'Lakh Baksh'? A. Qutbuddin Aibak B. Muhammad-Bin-Tughluq C. Balban D. Iltutmish	
12	How did Sultan Qutbuddin Aibak die? A. He died after a fall from his horse while playing Chaugan B. He sustained injuries while besieging the fortress of Kalinjar in Bundelkhand and succumbed to them later C. He was killed in a battle with Taj-u-din Yildiz the ruler of Ghazni who entered into a contest with him over the capture of Punjab D. He was treacherously stabbed to death by one of his ambitious nobles	

13	Who was the first Sultan of Delhi who introduced regular coins and declared Delhi the capital of his empire? A. Balban B. Aram Shah C. Iltutmish D. Nasiruddin Mahmud	
14	Who was called 'a slave of a slave'? A. Iltutmish B. Balban C. Qutbuddin Aibak D. Mohd. Ghori	
15	The original name of Changez (Genghis) Khan was________. A. Ogadi B. Temuchin C. Yesugai D. Zhenjin	
16	Which Sultan of Delhi is said to have followed the policy of 'blood and iron'? A. Firuz Shah Tughluq B. Jalaluddin Firuz Khalji C. Balban D. Iltutmish	
17	After consolidating his power, Balban assumed the grand title of_______. A. Din-I-Ilahi B. Zil-I-Ilahi C. Kaiser-I-Hind D. Tuti-e-Hind	
18	Who among the following introduced the famous Persian festival 'Navroz' in India? A. Alauddin Khalji B. Firuz Tughluq C. Iltutmish D. Balban	
19	Padmavati is associated with Ala-udDin's conquest of Chittor. She was supposed to be the wife of_______. A. Rana Ratan Singh B. Raja Man Singh C. Ranjit Singh D. Maharana Pratap Singh	

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20	Which of the following Sultans introduced 'Market Reforms'? A. Balban B. Muhammad Tughluq C. Alauddin Khalji D. Jalaluddin Khalji	
21	Given below are two statements, one labelled as Assertion (A) and the other as Reason (R). Assertion (A) : Alauddin Khalji introduced price control in Delhi. Reason (R): He wanted to pay lower wages to the artisans building his palaces in Delhi. Select the correct answer from the code given below. A. (A) is false, but (R) is true B. (A) is true, but (R) is false C. Both (A) and (R) are true, but (R) is not the correct explanation of (A) D. Both (A) and (R) are true and (R) is the correct explanation of (A)	
22	The Sultans of which dynasty ruled the country for the longest period? A. Tughluq dynasty B. Slave dynasty C. Lodi dynasty D. Khalji dynasty	
23	Who amongst the following Generals of Alauddin Khalji, ultimately became the first Sultan of the Tughluq dynasty? A. Ubigh Khan B. Zafar Khan C. Malik Kafur D. Ghazi Malik	
24	Which Sultan introduced new Department 'Aamir-e-Kohi'? A. Sikandar Lodi B. Muhammad-Bin-Tughluq C. Firuz Shah Tughluq D. Alauddin Khalji	

25	Which Sultan of Delhi had established a separate Agriculture Department and had planned the 'rotation of crops'? A. Muhammad-Bin-Tughluq B. Alauddin Khalji C. Balban D. Iltutmish	
26	Diwan-E-Kohi is associated with_________. A. Alauddin Khalji B. Akbar C. Firuz Shah Tughluq D. Muhammad-Bin-Tughluq	
27	Muhammad-Bin-Tughluq had transferred his capital from Delhi to________. A. Lahore B. Kannauj C. Kalinjeb D. Daulatabad	
28	Ibn Battuta, the Moorish traveller, visited India during the reign of________. A. Mahmud Ghazni B. Akbar C. Babar D. Muhammad-Bin-Tughluq	
29	Who among the following Sultans of Delhi established an 'Employment Exchange' to help the unemployed? A. Firuz Shah Tughluq B. Muhammad-Bin-Tughluq C. Alauddin Khalji D. Balban	
30	The Sultan of Delhi who is reputed to have built the biggest network of canals in India was________. A. Sikandar Lodi B. Firuz Shah Tughluq C. Ghiyasuddin Tughluq D. Iltutmish	

31	Which one of the following dynasties ruled over India after the invasion of Timur? A. Khalji Dynasty B. Tughluq Dynasty C. Sayyid Dynasty D. Lodi Dynasty	
32	The Mughal ruler of medieval India was _________. A. Persian (Iranian) B. Chagatai Turk C. Afghans D. Persian	
33	The longest flowing river in India is A. Mahanadi B. Godavari C. Ganga D. Narmada	
34	Near Mansarovar lake in Tibet, there is the source of river. A. Brahmaputra B. Satluj C. Indus D. All of the above	
35	In India, 'Yarlung Zangbo River' is known as A. Ganga B. Indus C. Brahmaputra D. Mahanadi	
36	Which one of the following rivers flows towards the West? A. Ganga B. Narmada C. Godavari D. Yamuna	
37	Which river of India is also known as 'Vridha Ganga'? A. Krishna B. Godavari C. Cauvery D. Narmada	

38	The Town located on the confluence of river Bhagirathi and Alaknanda is- A. Rudraprayag B. Devprayag C. Vishnuprayag D. Karnaprayag	
39	Which of the river does not originate in Indian territory? A. Ganga B. Sutlej C. Mahanadi D. Yamuna	
40	Which of the following Peninsular Indian River does not meet the Arabian Sea- A. Periyar B. Cauvery C. Narmada D. Tapti	
41	Which of the following river flow from south to north direction? A. Krishna B. Cauvery C. Son D. Godavari	
42	Which river flows between Satpura and Vindhyas? A. Godavari B. Gandak C. Tapti D. Narmada	
43	Which of the following river forms estuary? A. Narmada B. Cauvery C. Krishna D. Mahanadi	
44	An important river of Indian desert is- A. Luni B. Narmada C. Krishna D. Beas	

45	Which river in the Southern Peninsula has the second largest river basin in India? A. Godavari B. Krishna C. Cauvery D. Mahanadi	
46	Which of the following rivers makes an estuary? A. Krishna B. Mahanadi C. Kosi D. Narmada	
47	River Damodar is called 'Sorrow of Bengal' because it- A. Gets flooded often B. Causes maximum soil erosion C. Forms number of dangerous waterfalls D. Is not a perennial river	
48	On the tributary of which river has Rihand Dam been constructed? A. Chambal B. Yamuna C. Son D. Periyar	
49	Sivasamudram is an island formed by the river- A. Ganga B. Godavari C. Krishna D. Cauvery	
50	Baglihar Dam is constructed on which river? A. Indus B. Chenab C. Sutlej D. Ravi	
51	_____ is the largest river island in the world. A. Bhavani B. Umananda C. Munroe D. Majuli	

52	Which river forms its delta in Odisha? A. Godavari B. Mahanadi C. Narmada D. Tapti	
53	Damodar is a tributary of river A. Ganga B. Hooghly C. Padma D. Subarnarekha	
54	Analyze which of the following is not correctly matched? A. Gorakhpur - Rapti B. Ludhiana - Ravi C. Jabalpur - Narmada D. Surat – Tapti	
55	On which river is the Hirakud Dam constructed? A. Shivnath B. Narmada C. Mahanadi D. Son	
56	On which river is the Bhakra Nangal dam built? A. Ravi B. Indus C. Chenab D. Satluj	
57	Water dispute between Tamil Nadu and Karnataka is related to A. Krishna B. Cauvery C. Godavari D. Mahanadi	
58	‘Teesta hydropower project’ is located in which state? A. Himachal Pradesh B. Uttarakhand C. Arunachal Pradesh D. Sikkim	
59	Which of the following river is the home for freshwater dolphins? A. Brahmaputra B. Yamuna C. Ganga D. Sabarmati	

60	Which of the following river is known as India's River of Sorrow? A. Hooghly B. Damodar C. Ghaghara D. Ganga	
61	The Peninsular rivers which do not join the Arabian Sea are A. Narmada and Tapi B. Narmada and Cauvery C. Godavari and Krishna D. Tapi and Cauvery	
62	Analyze the following rivers and arrange them from South to North: 1. Cauvery, 2. Krishna, 3. Godavari, 4. Mahanadi A. 1 3 2 4 B. 3 4 1 2 C. 2 4 3 1 D. 1 2 3 4	
63	Neyveli Thermal Power Station located at which state? A. Gujarat B. Tamil Nadu C. Assam D. West Bengal	
64	Which river is called 'The Sorrow of Bengal'? A. Sone B. Damodar C. Hooghly D. Kosi	
65	The river on which the reservoir for Indira Gandhi Canal has been built is A. Sutlej B. Ravi C. Luni D. Jhelum	

66	The Rajya Sabha can have a maximum strength of: A. 200 B. 210 C. 250 D. 260	
67	The Lok Sabha is called in session for at least how many times in a year? A. Twice B. Once C. Thrice D. Four	
68	What is 'zero hour'? A. When the proposals of the opposition are considered B. When matters of utmost importance are raised C. Interval between the morning- and afternoon sessions D. When a Money Bill is introduced in the Lok Sabha	
69	Who is the ex-officio Chairman of Rajya Sabha? A. President B. Vice-President C. Minister of Parliamentary Affairs D. Leader of Opposition	
70	The Rajya Sabha can be dissolved by : A. Lok Sabha B. Constitutional amendment C. President D. None of the above	
71	If the Speaker of the Lower House of a State wants to resign, his letter of resignation is to be addressed to the: A. Chief Minister B. Deputy Speaker C. Governor D. President	
72	One-third of the members of the Rajya Sabha retire after every: A. One year B. Second year C. Third year D. Fifth year	

73	A Money Bill passed by the Lok Sabha has to be passed/returned by Rajya Sabha within: A. 14 days B. 21 days C. 1 month D. 3 months	
74	When can the Speaker exercise his right to vote in the House? A. Whenever he desires B. Whenever the House desires C. Only in the event of equality of votes D. Whenever his party directs	
75	In the case of a deadlock between the two Houses of the Parliament, the joint sitting is presided over by the: A. President B. Vice-President C. Speaker of Lok Sabha D. Member of the Lok Sabha specifically elected for the purpose	
76	The President nominates members to the Rajya Sabha according to: A. their performance as office bearers of cultural societies B. their role played in political set up of the country C. the recommendations made by the Vice-President D. their distinction in the field of science, art, literature and social service	
77	Who among the following may belong to the Rajya Sabha but can speak in both the Lok Sabha and the Rajya Sabha ? A. Ministers who are members of the Rajya Sabha B. Nominated members of the Rajya Sabha who may be experts in different fields of knowledge C. The Deputy Chairman of the Rajya Sabha D. Leader of the House in the Rajya Sabha	
78	Representatives of Union Territories in Lok Sabha are chosen by: A. direct elections B. indirect elections C. nomination D. All the above means	

79	As a non-member who can participate in the proceedings of either House of Parliament A. Vice President B. Chief Justice C. Attorney General D. Chief Election Commissioner	
80	Which one of the following statements is correct? A. Only the Rajya Sabha and not the Lok Sabha can have nominated members B. There is a constitutional provision for nominating two members belonging to the Anglo-Indian Community to the Rajya Sabha. C. There is no constitutional bar for nominated members to be appointed as a Union Minister D. A nominated member can vote both in the Presidential and Vice Presidential elections	
81	As per the Constitution of India, what is the limit prescribed for the number of members in the Legislative Assembly of a State? A. 350 members B. 400 members C. 450 members D. 500 members	
82	Who among the following recommends to the Parliament for the abolition of the Legislative Council in a State? A. The President of India B. The Governor of the concerned State C. The Legislative Council of the concerned State D. The Legislative Assembly of the concerned State	
83	State Governor is appointed by A. Central Cabinet B. Chief justice of Supreme Court C. Speaker of Lok Sabha D. President of India	
84	Who among the following in the state legislature decides whether a bill is a Money Bill or not? A. Speaker of Legislative Assembly B. Chief Minister C. Chairman of Legislative Council D. Leader of Majority party	

85	Who among the following in the state legislature decides the disqualification of a member of the legislative assembly arising on the grounds of 'defection'? A. Speaker of Legislative Assembly B. Chief Minister C. Chairman of Legislative Council D. Leader of Majority party	
86	Suppose the legislative assembly dissolves, and suppose a Bill is passed by the state legislative assembly and also legislative council at the time of dissolution, and awaiting Governor/President's assent, then what happens to that Bill? A. The Bill lapses B. The Bill does not lapse C. Depends on whether it is a Money Bill or not D. None of the above	
87	When was Parakram Diwas 2023 observed across India? A. 22nd January 2023 B. 26th January 2023 C. 23rd January 2023 D. 21st January 2023	
88	With which country's Army, the Indian Army has recently (in Feb '23) commenced the 4th edition of the bilateral joint military exercise, 'Ex-DUSTLIK IV – 2023', in Pithoragarh, Uttarakhand? A. Uzbekistan B. Mongolia C. Kazakhstan D. Kyrgyzstan	

89	Consider the following statements regarding Article 368 of the Constitutional amendment bill and analyze the following statements; 1. Constitutional amendment bills can be initiated only in Lok Sabha; not in Rajya Sabha. 2. The bill can be introduced either by the minister or by a private member. 3. The bill does not require prior permission from President. 4. The bill must be passed in each house with a special majority means 50 % of the total membership of the house and 2/3rd of the member of the house present and voting. Which of the above statements are correct; A. 1 and 2 only B.1,2,and 3 only C.2,3, and 4 only D.1,2,3, and 4 only	
90	Constitution can be amended in threeway; 1. By the simple majority of parliament. 2. By the special majority of parliament. 3. By the special majority of parliament and ratification of half of the state legislative. Which of the above amendments come under article 368. A.1and 2 only B.1 and 3 only C.2 and 3 only D.1, 2, and 3 only	
91	An amendment of the constitution can be initiated only in? A. Rajya Sabha Only B. Lok Sabha Only C. Either Rajya Sabha or Lok Sabha D. Either Parliament or State Legislatures	

92	Which of the following points is/are 'correct' with respect to the International Cricket Council (ICC awards 2022)? A. India's Suryakumar Yadav has won the ICC Men's T20I Cricketer of the Year 2022 and became the 2nd batter after Pakistan's Mohammad Rizwan to score more than 1000 runs in 2022 in T20Is. B. Renuka Singh has won the ICC Emerging Women's Cricketer of the Year 2022 award. C. Pakistan's Babar Azam won the Sir Garfield Sobers Trophy for ICC Men's Cricketer of the Year 2022 as well as ICC Men's ODI Cricketer of the Year 2022. A. Only A & B B. Only B & C C. Only A & C D. All A, B & C	
93	A bill for the amendment in Indian Constitution can be presented A. Only in Lok Sabha B. Only in Rajya Sabha C. Either in Lok Sabha or Rajya Sabha D. In the Supreme Court of India	
94	The First Constitution Amendment Bill passed in 1951 was related to A. Security of the country B. Security of the Prime Minister C. Protection of agrarian reforms in certain States D. Scheduled Castes and Scheduled Tribes	
95	The 93rd Constitution Amendment Bill deals with the A. Continuation of reservation for backward classes in government jobs B. Free and compulsory education for all children between the age of 6 and 14 years C. Reservation of 30% posts for women in government recruitments D. Allocation of more number of Parliamentary seats for recently formed States	

96	Which one of the following Amendments to the Constitution is related to the Lowering of the age of voters? A.61st Amendment B.44th Amendment C.42nd Amendment D.24th Amendment	
97	The basis structure theory of the Constitution of India implies that A. Certain features of the Constitution are so essential to it that they cannot be abrogated B. Fundamental rights cannot be abridged or taken away C. The Constitution cannot be amended except in accordance with the procedure laid down in Article 368 D. The Preamble of the Constitution cannot be amended for it is not a part of the Constitution and at the same time represents it real spirit	
98	Keoladeo National Park is located in____________ A. Assam B. Rajasthan C. Gujarat D. Punjab	
99	What is the Capital of Arunachal Pradesh? A. Chandigarh B. Hyderabad C. Itanagar D. Gandhinagar	
100	Which of the following taxes are abolished by the Goods and Services Tax (GST). A. Property tax B. Corporation tax C. VAT D. All of the above	
101	Which model of GST has been chosen by India? A. USA B. Canada C. UK D. China	

102	Analyze which one of the following statements regarding the levying, collecting, and distribution of customs duty is correct? A. The union levies, collects, and distributes proceeds of customs duty between itself and the states. B. The union levies, collects, and keeps all the proceeds of customs duty to itself. C. The union levies and collects the tax, but all the proceeds are distributed among the states. D. Only the surcharge levied on customs duty is shared between the union and the states.	
103	Analyze the following statement: An increase in tax-to-GDP ratio of a country indicates which of the following? 1. Increase in the proportion of formal sector of the economy 2. Rise in the income level of the people Select the correct answer using the codes given below: A. 1 only B. 2 only C. Both 1 and 2 D. Neither 1 nor 2	
104	Which among the following taxes is levied by state government only? A. Wealth Tax B. Estate Duty C. Corporation tax D. Entertainment Tax	
105	In a progressive tax, the following statements holds true: A. Yield from income tax increases as the national income increases. B. Yield from income tax decreases as the national income increases C. Yield from income tax does not alter as the national income increases D. Yield from income tax may increase or decrease as the national income increases	

106	Consider and analyze the following taxes: 1. Service Tax 2. Tax on profession of CA 3. Tax on interest earned on investment Which among the above is / are indirect taxes? A. Only 1 B. Only 1 & 2 C. Only 2 & 3 D. 1, 2 & 3	
107	Under which of the following circumstances may “capital gains” arise? 1. Profits arising from sale of flats kept as stock by a property dealer 2. Profit arising from sale of flat to a salaried employee 3. Profit arising from sale of business premises to a business person Select the correct answer using the codes given below: A. 1 only B. 2 and 3 only C. 2 only D. 1, 2, and 3	
108	Which one of the following statements regarding the levying. Collecting and distribution of Income Tax is correct? A. The Union levies, collects and distributes the proceeds of income tax between itself and the states B. The Union levies, collects and keeps all the proceeds of income tax to itself C. The Union levies and collects the tax but all the proceeds are distributed among the states D. Only the surcharge levied on income tax is shared between the Union and the states	
109	Which of the following does not form part of current account under balance of payments? A. Export and import of goods B. Export and import of services C. Income receipts and payments D. Capital receipts and payments	

110	The components of a Balance of Payment account are__________. A. Capital Account B. Current Account C. Both A and B. D. None of the above	
111	Trade Deficit occurs when ______________. A. Export of goods is less than imports of goods B. Export of goods is more than imports of goods C. Export of services is less than imports of services D. Export of services is more than imports of services	
112	A business organisation located within India invests in a foreign-based company. This transaction is recorded in the ____________ of ____________ account within the Balance of Payment account of India. A. Debit side, current B. Credit side, current C. Debit side, capital D. Credit side, capital	
113	Balance in capital account refer to the A. Nation's net exports of goods and services B. Nation's net exports of financial claims C. Nation's net exports of international official reserve assets D. Nation's sum of net exports of goods, services and financial claims	
114	Analyze which of the following are the components of balance of payments? 1. Financial capital transfer 2. External loan and investment 3. Foreign institutional investment 4. Issuing of external bonds 5. Export and imports of goods and services Select the correct answer using the codes given below: A. 1, 2, and 3 only B. 2, 3, and 4 only C. 1, 4, and 5 only D. 1, 2, 3, 4, and 5	

115	Current account includes- A. Credits and debits on the trade of merchandise, which includes goods such as raw materials and manufactured goods that are bought, sold or given away . B. credits and debits on the trade of merchandise, along with services like tourism etc. C. unilateral transfers which are credits that are mostly worker's remittances, which are salaries sent back into the home country of a national working abroad, as well asforeign aids that are directly received. D. All of the above.	
116	Capital account convertibility is related to- A. Freedom to invest in financial assets of other countries. B. It does not allow foreign investors to purchase Indian financial asset. C. The definition was CAC was given by Rangarajan committee. D. All of the above	
117	In relation to income and exchange rates- A. Increase in income compulsorily leads to increase in exchange rate. B. Increase in income may or may not lead to increase in exchange rate. C. Consumption pattern has nothing to do with exchange rate. D. All of the above	
118	According to the Nikkei Asia report released in January 2023, India surpassed _________ as the world's third-largest auto market in 2022. A. Russia B. Germany C. Japan D. Australia	
119	Who among the following declared the First Industrial Policy in the Post-Independence Period? A. Jawahar Lal Nehru B. Syama Prasad Mookerjee C. Bayya Suryanarayana Murthy D. Rafi Ahmed Kidwai	

120	The joint sector implies cooperation between __: A. Domestic and foreign industries B. Small-scale and large-scale industries C. Public-sector and private-sector industries D. State government and central government enterprises	